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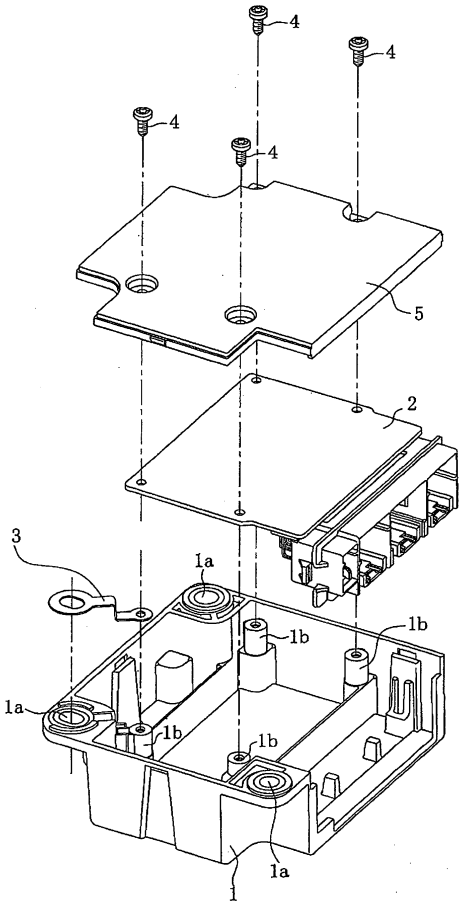
(54) OCCUPANT RESTRAINT DEVICE CONTROL DEVICE

(57) [Problem] To provide grounding performance similar to that of the conventional counterpart even in a case made of resin.

[Means of Solution] An occupant restraint device controller, including an electronic circuit substrate 2 incorporating therein a control circuit that determines whether or not a vehicle 6 has collided based on a detection output of a sensor detecting acceleration/deceleration of the vehicle 6 and outputs a control signal for activating an occupant restraint tool. The electronic circuit substrate 2 is accommodated inside a resin case 1 provided with a structure for leading out a ground electrode from inside to outside. The structure for leading out a ground electrode is configured such that a fixing leg 1b for fixing the electronic circuit substrate 2 is provided inside the case 1, this fixing leg 1b being connected to a mounting portion 1a to be mounted to the vehicle 6, via a ground lead-out member 3 including a first spring structure 3a held between the fixing leg 1b and the electronic circuit substrate 2, a ground terminal 3b held between the case 1 and part of the vehicle 6, and a second spring structure 3c connecting the first spring structure 3a and the ground terminal 3b.

[Effect] The need for grounding and sensor performance similar to that of conventional counterparts can be satisfied even if a resin case is employed.

FIG.1



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Description

TECHNICAL FIELD

[0001] The present invention relates to an occupant restraint device controller for electrically controlling activation of an occupant restraint device installed in an automobile as a safety device.

BACKGROUND ART

[0002] An air bag device, for example, which deploys an air bag with gas to restrain an occupant in the event of a collision thereby to protect the occupant from the impact of the collision, is electrically controlled by an air bag controller for the deployment of the air bag.

[0003] This air bag controller is configured to include a sensor for detecting acceleration or deceleration and an electronic circuit substrate incorporating therein a control circuit that determines whether or not the vehicle has collided based on the detection output of the sensor and outputs a control signal for deployment of the air bag.

[0004] The case that accommodates the above-mentioned electronic circuit substrate therein has conventionally been made of metal such as aluminum die cast in order to secure reliability (for example, Patent Document 1). However, the demand for weight reduction has increased in recent years in response to the increased awareness of environmental issues, because of which the case is now desired to be made of resin.

Patent Document 1: Japanese Patent Application Laid-open No. 2000-33848

[0005] The case typically has a structure that allows the electronic circuit substrate to be grounded to the outside for stabilization of the electronic equipment. If, however, the case is made of resin, the case cannot be grounded. Therefore, grounding performance similar to that of the conventional counterpart needs to be provided, using a separate component.

[0006] The problem to be solved by the present invention is that, if the case is made of resin in response to the demand for weight reduction, such case cannot be grounded, because of which grounding performance similar to that of the conventional counterpart needs to be provided, using a separate component.

DISCLOSURE OF THE INVENTION

[0007] The occupant restraint device controller of the present invention employs the following configuration in order to provide grounding performance similar to that of the conventional counterpart even if the case is made of resin.

[0008] Namely, the most primary characteristic of the occupant restraint device controller of the present invention is that it includes; a sensor detecting acceleration or deceleration of a vehicle; and an electronic circuit substrate incorporating therein a control circuit that determines whether or not the vehicle has collided based on a detection output of this sensor and outputs a control signal for activating an occupant restraint tool, wherein the electronic circuit substrate is accommodated inside a resin case provided with a structure for leading out a ground electrode from inside to outside, and the structure for leading out a ground electrode is configured such that a fixing leg for fixing the electronic circuit substrate is provided inside the case, this fixing leg being connected to a mounting portion to be mounted to the vehicle, via a ground lead-out member including a first spring structure held between the fixing leg and the electronic circuit substrate, a ground terminal held between the case and part of the vehicle, and a second spring structure in a bent shape connecting the first spring structure and the ground terminal.

[0009] According to the present invention, the electronic circuit substrate is accommodated in the resin case provided with the structure for leading out a ground electrode from inside to outside, so that grounding performance similar to that of the conventional counterpart can be provided even if a resin case is employed in an attempt to reduce weight.

[0010] Further, according to the present invention, the ground lead-out member includes the first spring structure held between the fixing leg and the electronic circuit substrate, the ground terminal held between the case and part of the vehicle, and the second spring structure in a bent shape connecting the first spring structure and the ground terminal, so that any secular changes that may develop in a mounting portion of the ground lead-out member can be absorbed.

[0011] According to the present invention, grounding performance similar to that of the conventional counterpart can be provided even if a resin case is employed for weight reduction, by providing a structure in the case for leading out a ground electrode from inside to outside.

[0012] Accordingly, the need for sensor performance equivalent to that of the conventional counterpart is satisfied, and the weight reduction of the sensor leads to a reduction in vehicle weight, as a result of which fuel economy of the vehicle can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is an exploded perspective view showing essential parts of the occupant restraint device controller of the present invention;
FIG. 2(a) to FIG. 2(c) show the essential parts of the occupant restraint device controller of the present invention in the assembling order, FIG. 2 (a) showing a state in which a ground lead-out member is mounted to the case, FIG. 2 (b) showing a state in which an electronic circuit substrate is mounted in addition to the state FIG. 2(a), and FIG. 2(c) showing a state in which a cover is mounted in addition to the state FIG. 2(b); and
FIG. 3 (a) to FIG. 3(c) are diagrams for explaining the ground lead-out member, FIG. 3 (a) being a perspective view, FIG. 3 (b) being a longitudinal cross-sectional view of a portion where the ground lead-out member is mounted to a fixing leg, and FIG. 3(c) is a longitudinal cross-sectional view of a mounting portion to be mounted to the vehicle.

EXPLANATION OF REFERENCE NUMERALS

[0014]

1	case
1a	mounting portion
1b	fixing leg
2	electronic circuit substrate
3	ground lead-out member
3a	first spring structure
3b	ground terminal
3c	second spring structure
6	vehicle

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] The present invention achieved the object of providing grounding performance similar to that of the conventional counterpart even when a resin case is employed for weight reduction, by providing a structure to the case for leading out a ground electrode from inside to outside.

EMBODIMENTS

[0016] Exemplary embodiments for carrying out the present invention will be hereinafter described using FIG. 1 to FIG. 3.
Reference numeral 1 denotes a resin case, which has a box-like shape with the top and one side wall open, and is provided with vehicle mounting portions 1a at three corners, for example, on the outer circumference of the top opening. In order that an electronic component substrate 2 incorporating therein a control circuit for outputting a control signal to deploy an air bag, for example, can be accommodated, fixing legs 1b for fixing the electronic component substrate 2 are provided at four corners inside this case 1.

[0017] Reference numeral 3 denotes a ground lead-out member for leading out a ground electrode from the inside of the case 1 to the outside, which connects one of the mounting portions 1a and one of the fixing legs 1b of the case 1 (see FIG. 2(a)).

[0018] This ground lead-out member 3 is made up of a first spring structure 3a that is the portion to be mounted to the fixing leg 1b, a ground terminal 3b that is the portion to be mounted to the vehicle 6, and a second spring structure 3c that connects these first spring structure 3a and ground terminal 3b.

[0019] Of these, the first spring structure 3a has a configuration in which, for example as shown in FIG. 3(a), part thereof is cut out with a slit, and a step is formed to this cut-out portion 3aa. The first spring structure is mounted such as to be held between the fixing leg 1b and the electronic circuit substrate 2, as shown in FIG. 3(b), with a screw 4. In this way, this spring structure enables grounding strength of the electronic circuit substrate 2 to be maintained even if the case 1 reduces in size due to changes over time. Reference numeral 5 denotes a cover attached on top of the electronic circuit substrate 2.

[0020] The ground terminal 3b, on the other hand, does not employ such a structure as that of the first spring structure 3a. Therefore, as it is mounted with a bolt 7 such as to be held between the mounting portion 1a and part of the vehicle 6 as shown in FIG. 3 (c), this mounting portion cannot absorb changes over time of the case 1.

[0021] However, since the portion connecting the first spring structure 3a and the ground terminal 3b is formed in a bent shape to have a spring structure (second spring structure 3c), this second spring structure 3c enables grounding strength of the electronic circuit substrate 2 to be maintained even if the case 1 reduces in size due to changes over time.

[0022] Namely, according to the present invention, with the effect of the first spring structure 3a and the second spring structure 3c of the ground lead-out member 3, stabilization of the electronic equipment can be ensured even if the resin case 1 is employed in an attempt to reduce weight.

[0023] Described below is the results of a constant temperature humidity test (ambient temperature: 85°C, humidity: 85%, 1000 hours) carried out to prove that the above-described present invention exhibits electronic equipment stabilizing performance equivalent to that of conventional products that employ aluminum die cast cases.

[0024] Table 1 below shows the contact resistance before the constant temperature humidity test, and Table 2 shows the contact resistance after the constant temperature humidity test, of the present invention products and conventional products. In the invention product 1 in Tables 1 and 2, fixing was achieved with screws as shown in the accompanying drawings, while in the invention product 2, attachment with the fixing legs was achieved by thermal bonding. The conventional product 1 was grounded at four points, while the conventional product 2 was grounded at five points.

[0025]

[Table 1]

	Portion mounted to fixing leg	Portion mounted to vehicle
Invention product 1	0.010	0.017
Invention product 2	0.015	0.010
Conventional product 1	0.012	0.012
Conventional product 2	0.010	0.012
(unit: Ω)		

[0026]

[Table 2]

	Portion mounted to fixing leg	Portion mounted to vehicle
Invention product 1	0.010	0.015
Invention product 2	0.003	0.015
Conventional product 1	0.010	0.060
Conventional product 2	0.001	1.850
(unit: Ω)		

[0027] From Tables 1 and 2 above, it was proved that the resistance did not change much before and after the test in both of the present invention products 1 and 2 and the conventional products 1 and 2, and that there was no difference in resistance between the present invention products 1 and 2 and the conventional products 1 and 2. Thus it can be seen that the present invention can exhibit electronic equipment stabilizing performance equivalent to that of conventional counterparts that employ metal cases.

[0028] The present invention is not restricted to the above-described example and the embodiment may be changed suitably as long as such changes are made within the scope of technical ideas described in the claims.

[0029] Namely, the occupant restraint device controller described in the foregoing is a preferred example of the present invention, and other embodiments than the above can be worked out or carried out in various manners. Unless otherwise expressed herein to the contrary, the present invention should not be restricted to the shape, size, and configuration/layout and the like of particular components shown in the accompanying drawings. The expressions and terms used herein are for illustrative purposes only and not meant to be limiting unless otherwise expressed to the contrary.

[0030] For example, attachment to the fixing leg 1b is not restricted to by way of screws 4 as described with reference to FIG. 3, but may be achieved by thermal bonding as with the invention product example 2.

INDUSTRIAL APPLICABILITY

[0031] The present invention described above is effective for any cases, not only of a device for controlling deployment of an airbag, but of a device for controlling restraint with a seatbelt or the like, as long as the case accommodates equipment that needs to be grounded.

Claims

1. An occupant restraint device controller, comprising:

a sensor detecting acceleration or deceleration of a vehicle; and
an electronic circuit substrate incorporating therein a control circuit that determines whether or not the vehicle has collided based on a detection output of this sensor and outputs a control signal for activating an occupant restraint tool,
wherein the electronic circuit substrate is accommodated inside a resin case provided with a structure for leading out a ground electrode from inside to outside, and
the structure for leading out a ground electrode is configured such that a fixing leg for fixing the electronic circuit substrate is provided inside the case, this fixing leg being connected to a mounting portion to be mounted to the vehicle, via a ground lead-out member including a first spring structure held between the fixing leg and the electronic circuit substrate, a ground terminal held between the case and part of the vehicle, and a second spring structure in a bent shape connecting the first spring structure and the ground terminal.

FIG.1

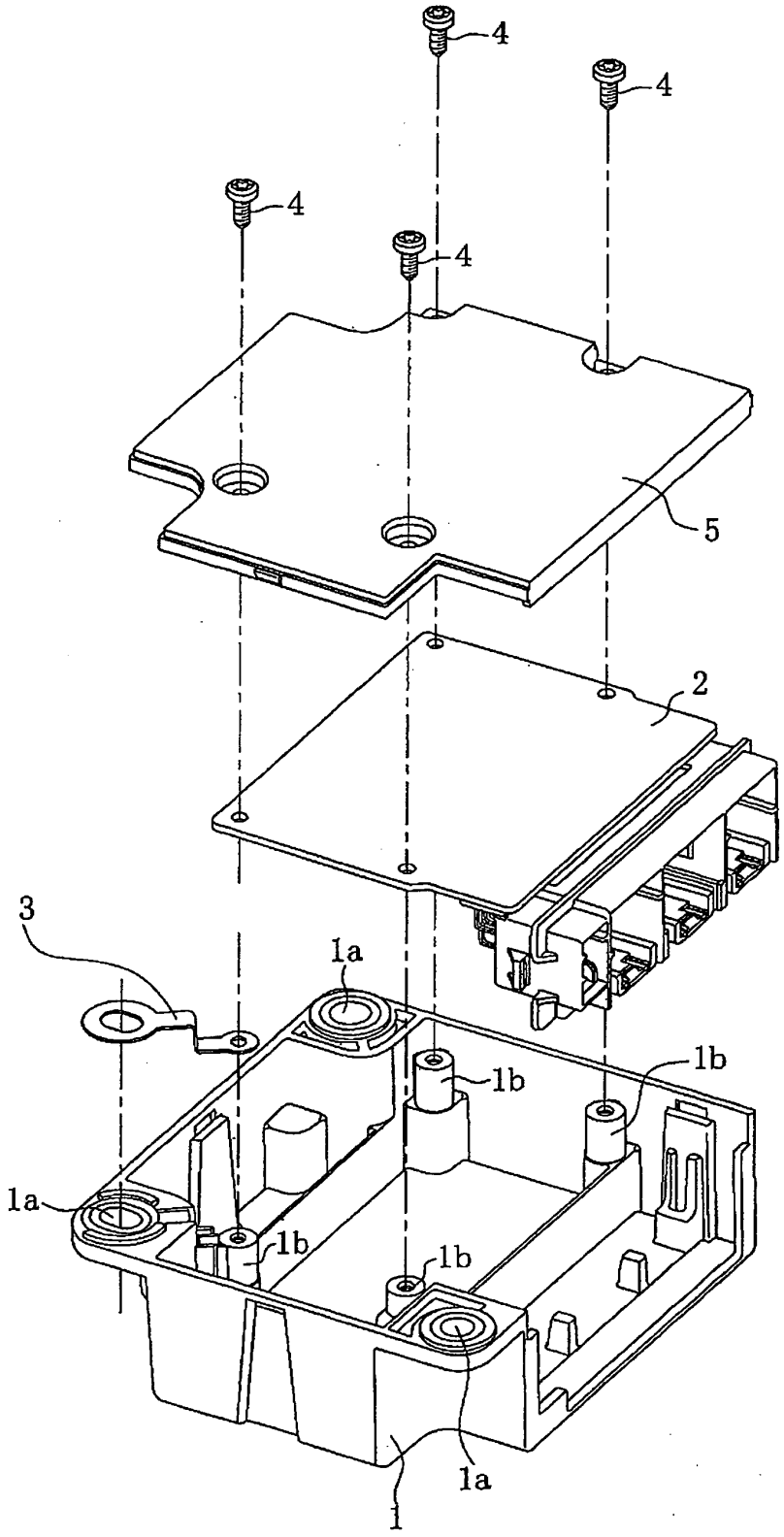


FIG.2

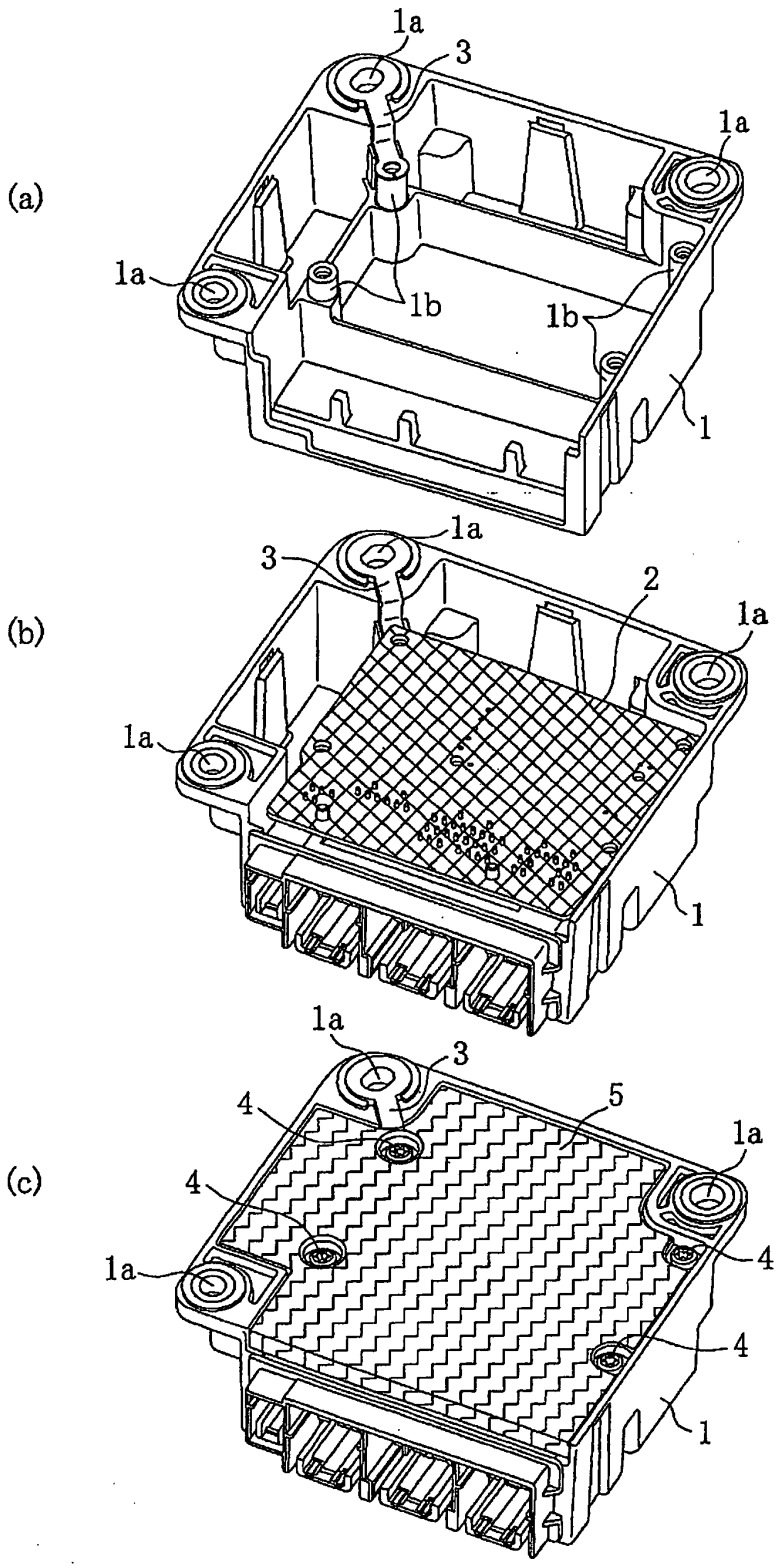
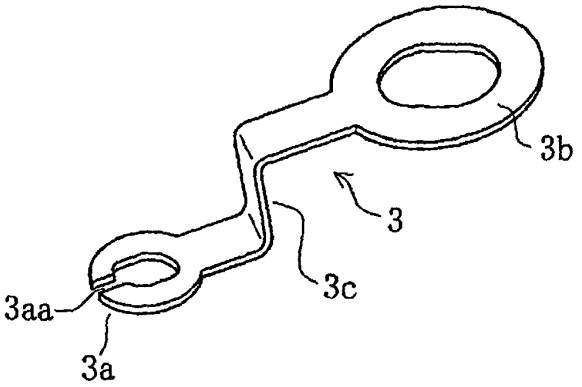
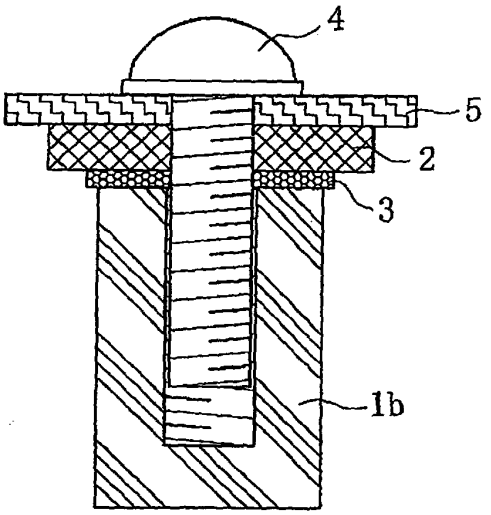


FIG.3

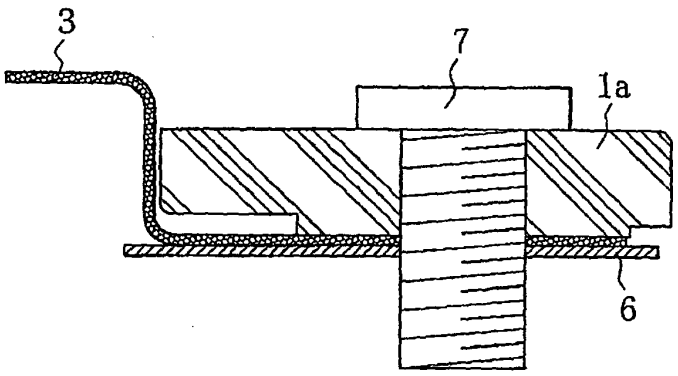
(a)



(b)



(c)



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2010/054435

A. CLASSIFICATION OF SUBJECT MATTER
B60R21/00(2006.01)i, *B60R16/02*(2006.01)i, *H05K9/00*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60R21/00, B60R16/02, H05K9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2010
Kokai Jitsuyo Shinan Koho 1971-2010 Toroku Jitsuyo Shinan Koho 1994-2010

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2003-260992 A (Denso Corp.), 16 September 2003 (16.09.2003), paragraphs [0012] to [0016], [0040], [0060] to [0067]; fig. 4 (Family: none)	1
A	JP 2006-319854 A (Matsushita Electric Industrial Co., Ltd.), 24 November 2006 (24.11.2006), paragraph [0034]; fig. 1 (Family: none)	1
A	JP 2005-64938 A (NEC Access Technica, Ltd.), 10 March 2005 (10.03.2005), paragraph [0038]; fig. 2 & US 2005/0078039 A1 & EP 1507313 A2 & CN 1581573 A	1

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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Date of the actual completion of the international search	Date of mailing of the international search report
18 May, 2010 (18.05.10)	01 June, 2010 (01.06.10)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2000033848 A **[0004]**